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PRELIMINARY NOTE ON THE OBSERVATIONS OF THE SURFACE
FEATURES OF *MARS* DURING THE OPPOSITION OF 1892,
BY J. M. SCHAEBERLE.

My observations on the planet *Mars* were commenced on June 11 and have, with some interruptions, been continued up to the present time. The planet has also been more or less regularly observed by the other astronomers of this observatory and also by Professor HUSSEY. In this note, however, only my own observations and views come under consideration. These views may be considerably modified by the observations still to be made during the present year, so that no definite statements as to the character of the final results can be made before the end of October.

Remarkable surface changes have certainly been going on in the south polar regions of *Mars*. The character of these changes almost forces one to the conclusion that great areas in the polar region are covered with congealed matter very similar in nature to some of the forms of water at certain temperatures on the earth's surface. A series of drawings showing the character of these changes, some of which were shown to the Society at our last meeting, will be published later on.

In this note I wish particularly to point out a rather singular contradiction which has almost persistently presented itself to my mind during the whole time that these observations have been going on. SCHIAPARELLI, FLAMMARION and observers of *Mars* in general agree, I believe, in calling the darker areas of *Mars* water and the brighter portions land—at least one is led to this conclusion by the nomenclature almost universally used in describing the various surface features of *Mars*.

My own observations have led me to incline to just the opposite view. Some of the reasons for coming to such a conclusion are given below.

1st. If the dark markings are water how are we to explain the irregular gradations of shade which, according to observation, are fixed surface features?

2d. If the dark markings are land just such observed gradations would naturally be expected.

3d. Light reflected from a spherical surface of water in a slight state of agitation would vary uniformly in intensity. At opposition the center of the planet would, for a water surface, appear

brightest. Observations show that within a certain distance from the edge of *Mars* there is a gradual increase in the steady lustre of the brighter areas towards the center of the planet.

4th. If the dark areas are water, they should according to the preceding paragraph be least dark near the center, but observations show that these markings are most conspicuously dark and the contrasts between light and shade most strong near the center of the disk.

5th. At certain times which can not be predicted, whole areas of limited extent, corresponding to portions of bright areas, and usually bounded on two or more sides by darker markings are seen to be more brightly illuminated than other portions of the disk as though the reflecting surface was in a state of agitation suitable for causing the observed phenomena (like the contrasts which result between the conditions due to light reflected from a calm and from an agitated water surface). Excepting the polar regions, such changes have invariably been noticed, by me, in the brighter areas only.

6th. Crossing the darker areas are still darker streaks which often extend hundreds of miles in nearly straight lines. One end of a given streak usually terminates in the equatorial region at a point where the dark area protrudes into the bright area, and the so-called canals seem to be continuations of the streaks. Where these dark streaks seem to intersect the limb of *Mars* the white areas projecting beyond the terminator of *Mars* (often noticed in June and July during the partial phase) were usually seen, indicating that the dark streaks were elevated above the general surface and rendered more bright by being projected against a dark background. That the bright areas projecting beyond the terminator actually lie in a dark streak needs further confirmation.

7th. The fainter markings called *canals* would, on this hypothesis, correspond to the ridges of mountain chains which are almost wholly immersed in water. The doubling of these markings represents parallel ridges of which our own earth furnishes examples. These fainter markings usually end in, or converge to, a conspicuous dark area which may be of very limited extent. As stated above, they usually begin at some protruding dark area formed by the junction of two or more dark streaks as though the canals were continuations of the streaks. The narrowness of the visible parts would account for the difficulty of seeing them.

8th. As a concluding argument in favor of the theory that the dark parts are land and the brighter areas water, I take an observed terrestrial phenomenon.

About twenty-five miles to the northwest of Mt. Hamilton is the lower end of San Francisco bay. In fair weather the whole country from Mt. Hamilton to San Francisco, a distance of fifty miles, is plainly visible. Now at all hours of the day *the surface of San Francisco Bay* (as seen from the top of Mt. Hamilton) *is much brighter than the neighboring valley and mountains at the same distance*, although the line of sight makes an angle of more than 87° with the normal to the surface of the bay and the observer's position varies all the way from being nearly in a direct line between the bay and the sun to the position in which the sun is nearly in the direction of the bay.

The internal reflections in an atmosphere not perfectly transparent would tend to render an underlying water surface much brighter than a surface of land in the same position.

As stated above these views may be modified somewhat by the observations still to be made during the present year.

LICK OBSERVATORY, Sept. 3, 1892.

NOTICE TO MEMBERS.

The edition of Numbers 1 and 2 of our *Publications* is exhausted. We have, however, quite a number of copies (some 200) of Nos. 3, 4 and 5 on hand. Volume I of the *Publications* comprises Nos. 1, 2, 3, 4, 5. If a sufficient number of persons signify their desire to purchase Volume I complete (price \$2), the lacking numbers of the *Publications* will be reprinted and the volume distributed. Such orders should be addressed to

The Committee on Publication A. S. P.,
Mount Hamilton, California.

OCCULTATION OF JUPITER AND HIS SATELLITES, SEPT. 8, 1892.

The observations recorded below were made with the 36-inch refractor using a power of 700 diameters. The seeing at the ingress of satellite I was very good, but the other observations were made under less favorable atmospheric conditions. The immersions occurred just before sunrise. The emersions were